

Appln. No.: 09/942,835
Amendment Dated August 25, 2003
Reply to Office Action of June 20, 2003

SAR 14108

REMARKS/ARGUMENTS

In the above-pending application, claims 1-8, 11-13, 16-18, 20-21, and 31-32 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over one or more of Fujii (US 4,952,523), Ohsawa et al. (US 5,210,433), and Marsh et al. (US 6,196,932). These rejections are respectfully overcome by the amendments transmitted herewith.

Claim 1 and 2 have been rejected as being unpatentable over Fujii. With regard to claim 1, the Office Action recites:

"Fujii teaches (figs. 8 and 9) a charge coupled device made on a substrate of a first conductivity type (10), the charge coupled device comprising: a dielectric layer (12) overlaying at least a portion of the substrate, and at least two gate electrodes (42, 44) overlaying the dielectric layer, the at least two gate electrodes defining at least two charge wells (32) and (34, 36), the at least two gate electrodes being separated by an inter-electrode gap (the gap between 42 and 44) and means for stabilizing the inter-electrode gap."

Applicants respectfully disagree with this analysis as it pertains to the subject application. It should be noted that, in Fujii:

- (42) is not a gate electrode. Rather, it is an anti-blooming electrode, presenting a substantial difference in structure and operation of the present invention and Fujii. The two gate electrodes in Fujii are consecutive pairs of electrodes (44); and
- the two charge wells are not (32) and (34,36). (32) is the substrate, which functions as a buried channel transmission layer, and (34,36) are the virtual electrodes. The charge wells in Fujii correspond to the areas directly under the gate electrodes (44), and are not distinctly pointed out by Fujii.

Furthermore, claim 1 recites, in part, "means for stabilizing the inter-electrode gap." The Examiner's discussion of claim 1 on page 2 of the Office Action does not identify the element(s) in Fujii that meet this recitation. Furthermore, Fujii does not disclose or suggest any structure that performs this stabilizing function. Therefore, claim 1 is not subject to rejection under 35 U.S.C. § 103(a) as being unpatentable over Fujii.

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Additionally, claims 3-6, 8, and 31-32 depend from claim 1 and are not subject to rejection under 35 U.S.C. § 103(a) for at least the same reasons as claim 1.

Referring to col. 8, lines 45-62 of Fujii, the Office Action's discussion of claim 2 contends that the stabilizing means are elements 34 and 36 in Fujii. Applicants respectfully disagree. Fujii nowhere discloses that any of its elements perform a stabilizing function. Further, the sections of Fujii cited by the Office Action state that regions 34 and 36 "provide virtual electrode regions." (col. 8, lines 43-46. See also, col. 8, lines 51-52, 55-56). A virtual electrode region is different from a stabilizing region. A virtual electrode shields a portion of a cell from any gate-induced change in potential. (See, col. 1, lines 8-10 and col. 2, lines 65-67 of U.S. Patent No. 4,229,752 to Hynceck incorporated by reference at page 12, lines 9-11 of the present application.) On the other hand, stabilizing elements "prevent[] charge barriers from developing in the gaps and interfering with charge transfer between adjacent electrodes." (page 18, lines 23-25). The Office Action has not cited anything to show that virtual electrode regions can be considered to be a "means for stabilizing the inter-electrode gap" as defined in applicants' disclosure.

Indeed, the purpose of the virtual electrode region, described above, is directly contrary to at least one of the stabilizing means disclosed in the subject application. At paragraph [0047] of the subject application, the very fields that Fujii's virtual electrode is made to suppress are described as being used as a stabilizing means. Furthermore, although the subject application also describes a separately doped semiconductor region as a stabilizing means, the semiconductor region is doped in the same conductivity type as the channel, not in the opposite type as for the Fujii virtual electrode.

In particular, Fujii does not disclose or suggest the use of "a semiconductor region of the first conductivity type but having a different dopant concentration than the substrate, in the inter-electrode gap for stabilizing the inter-electrode gap." In the invention defined by claim 2, the channel is formed in the substrate and the "semiconductor regions of the first conductivity type" are also formed in the substrate (see paragraph [0048]). While Fujii does disclose a doped region (i.e. elements 34 and 36) between the electrodes, it is of the opposite conductivity type from the channel and, thus, does not read on the limitations of claim 2. Accordingly, claim 2 is not subject to rejection under 35 U.S.C. § 103(a) as being unpatentable over Fujii.

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Claims 3-8, 11-13, 18, 20, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii in view of Ohsawa.

Ohsawa concerns a method for forming a CCD array using three metallization layers (see col. 4, line 48 through col. 5, line 16). This does not conform to any standard CMOS process. Furthermore, Ohsawa does not mention the term "CMOS" anywhere in his application. It is well known in the art that CCD imagers are generally not compatible with CMOS circuitry. The CMOS processes described in the subject application serve to enable the development and fabrication of CMOS circuitry on a single chip that also includes CCD imaging arrays. Neither Fujii, Ohsawa, nor their combination discloses an apparatus, method, or process that would enable one skilled in the art to develop a chip that includes both CMOS circuitry and CCD imaging arrays. Accordingly, neither Fujii, Ohsawa, nor their combination discloses or suggests that the dielectric layer is a CMOS gate dielectric layer, as required by claims 3-8, 11-13, 18, and 21.

Claim 7 has been amended to include all the limitations of base claim 1, and is made independent. No new matter is introduced therein.

With regard to claim 7, the Office Action states that "the combined structure of Fujii and Ohsawa inherently cause fringing fields as claimed in the gap region". There is no disclosure in Fujii, Ohsawa, or their combination that fringing fields are generated or that the fringing fields can be effectively used as stabilization means. In fact, Ohsawa recites:

"degradation in transfer efficiency which is caused by formation of a potential barrier and/or a potential pocket in the gap sections between the transfer electrodes and cannot be solved by conventional CCD image sensors can be significantly solved by only adding the gap potential control electrodes 30, 32, and/or 34 without complicatedly modifying the basic structure of the CCD image sensor." (See col. 6, lines 34-41).

Thus, Ohsawa teaches away from the use of any means of solving the problem of transfer efficiency degradation other than the use of gap potential control electrodes. Because neither Fujii nor Ohsawa disclose or suggest the existence of fringing fields or their use in stabilizing the inter electrode gap, the only suggestion to generate or use these fields comes from Applicants' disclosure. It is improper to use Applicants' own disclosure to render their claims obvious. Accordingly, claim 7 is not subject to rejection as being unpatentable over Fujii in view of Ohsawa.

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The embodiments claimed in independent claims 11, 18, and 20 of the subject application all include CMOS circuitry not disclosed in Fujii, Ohsawa, or their combination. The use of CMOS circuitry in a CCD imager provides several advantages to the current art. Among these advantages is the ability to fabricate a single device that includes CCD imaging arrays as well as CMOS circuitry. Because no reference has been cited which suggests that the two technologies can be combined on a single integrated circuit, the combination cannot be obvious in view of the cited references; the only motivation to combine these technologies comes from Applicants' own disclosure.

Accordingly, claims 11, 18, and 20 are not subject to rejection as being unpatentable over Fujii in view of Ohsawa. Further, claims 12-13 depend from claim 11 and are not subject to rejection for at least the same reasons as claim 11. Also, claim 21 depends from one of claims 18 and 20. Since those claims are allowable, claim 21 is also allowable.

Claims 16 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujii in view of Marsh.

Marsh pertains to a method of providing feedback from a sports apparatus having a surface for impacting an object. More specifically, a golf club is disclosed as including a pressure sensor on the head of the club, which detects and measures the force of impact, relaying the calculated results to the user via an LED display. Marsh uses analog-to-digital converters in sampling data from the sensors on the golf club.

The subject application pertains to a CMOS-CCD imaging system, and falls well beyond the field of endeavor of the Marsh invention. Additionally, applicants have not found any disclosure in Fujii of an analog to digital converter. Therefore, the Office Action has relied upon hindsight gained from applicants' disclosure to reject these claims.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *The teaching or suggestion to make the claimed combination and the reasonable*

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expectation of success must both be found in the prior art, and not based on applicants' disclosure. (emphasis added MPEP § 706.02(j)).

Here, the Office Action has relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or template to piece together the teachings of the prior art so that the claimed invention is rendered obvious. The Court has stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fritch*, 23 USPQ 2d 1780, 1783, 1784 (Fed. Cir. 1992).

The Examiner may not combine references based on hindsight gained from the subject invention. Because no reference has been cited which suggests that the two technologies can be combined, the combination can not be obvious in view of the cited references; the only motivation to combine these technologies comes from Applicants' own disclosure. The failure to find any reference that combines CCD and CMOS technologies demonstrates the accuracy of applicants' assertions in their specification and emphasizes the Office Action's reliance on hindsight to make this rejection.

Accordingly, claims 16 and 17 are not subject to rejection as being unpatentable over Fujli in view of Marsh.


Applicants acknowledge with thanks the Examiner's indication that claims 9, 10, 14 and 15 would be allowable if rewritten in independent form. Applicants have not rewritten those claims in independent form at this time because they believe that their parent claims are allowable.

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For all the foregoing reasons, applicants respectfully solicit allowance of claims 1-18, 20-21, 31 and 32.

Respectfully submitted,


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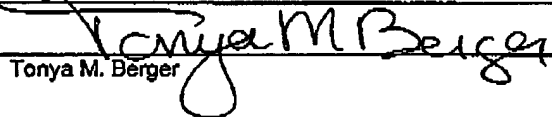
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